That positive momentum didn’t last long, as we began to hear rumblings about changes in the Renewable Fuels Standard that could dramatically reduce corn demand. This was quickly followed by the announcement of steel and aluminum tariffs that would not only increase the price of our raw materials, but would also lead to retaliatory tariffs on U.S. ag exports in one of our most important markets for soybeans and other major commodities. Adding to this uncertainty drama was a looming expiration of the 2018 Farm Bill with its important safety net for those who purchase the products we manufacture. In short — a year full of uncertainty.

Farming is a long-term, capital-intensive business. A farmer must feel optimistic about the future in order to make capital investments in new equipment. Farmers are naturally optimistic – they have to be to plant a crop and have faith that it will produce their income.

AEM is regularly asked to comment on the state of the agriculture industry. As an equipment manufacturing industry representative, I often find myself responding to questions from our members, reporters, or industry stakeholders related to current market conditions. Reporting on the health of the agriculture equipment industry is easy because AEM’s Tractor and Combine reports provide an objective measurement of sales. But as we all know, that is only part of the story. Telling the story behind the numbers is proving increasingly difficult.

2018 In Review

Looking back at 2018, the ag market can be summed up in one word – uncertainty. This time last year, the ag market — specifically the ag equipment market — looked very promising. Our industry was celebrating tax reform, decreased regulations, and a commodity market starting to show some signs of recovery.

That positive momentum didn’t last long, as we began to hear rumblings about changes in the Renewable Fuels Standard that could dramatically reduce corn demand. This was quickly followed by the announcement of steel and aluminum tariffs that would not only increase the price of our raw materials, but would also lead to retaliatory tariffs on U.S. ag exports in one of our most important markets for soybeans and other major commodities. Adding to this uncertainty drama was a looming expiration of the 2018 Farm Bill with its important safety net for those who purchase the products we manufacture. In short — a year full of uncertainty.

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continued, page 2
AEM Perspective

2019 Ag Outlook: Why Increased Certainty Should Breed Optimism

continued from page 1

But, over time, uncertainty erodes this built-in farmer optimism.

Looking Ahead

Looking into 2019 and beyond, it is pretty easy to once again be optimistic. This uncertainty in the ag market is showing signs of resolution. As I write this column, farmers are awaiting implementation of the new farm bill, looking forward to the year-round selling of e15 fuel, and hopeful of renewed soybean trade relations with China.

Let’s start with the 2018 Farm Bill. A pleasant surprise after the midterm elections was the push to get a farm bill passed before the end of the year. Even better, this new farm bill included both a renewed commitment to a farm safety net and a new provision to address rural broadband for benefit of precision farming. These two AEM supported efforts, along with many other updated provisions, are good for agriculture and for AEM members.

The recent government shutdown and changes in party control of the House Ag Committee may alter the implementation, but the foundational principals are set for the next few years. Overall, the passage of the farm bill should go a long way towards clearing up some of that uncertainty facing farmers as they consider investing in farm equipment.

Regarding the Renewable Fuels Standard, most current indications are positive news for ethanol and modern agriculture. AEM has been an active proponent of renewable energy as a way to drive additional demand for corn and soybeans. In December, several AEM representatives had a sit-down meeting with EPA Administrator Andrew Wheeler specifically to discuss year-round sales of e15. The outcome of the meeting lines up with statements made by the administration and USDA that this is to be approved prior sometime in early 2019.

This development, once solidified should provide some much-needed certainty for corn demand.

That leaves trade negotiations, specifically with China, as additional area of uncertainty. At the time of publication, there is no real progress on removal of the steel and aluminum tariffs. Although there are indications that China is again planning to purchase U.S.-produced soybeans, it still remains a bit uncertain. AEM has been an outspoken critic of the steel and aluminum tariffs while specifically pointing out the concern with retaliatory tariffs on U.S. agriculture.

This is a complicated issue with no real easy solution. Most farmers are still convinced that there will continue to be a demand for U.S. soy and crops around the world, but some are concerned with possible long-term changes in trade patterns that would change the demand landscape of the food our customers produce. The next few months should provide some additional certainty to this critical issue.

The Takeaway

So, are we seeing more certainty in these times of uncertainty? There are definitely indications that 2019 will provide more certainty for the U.S. Ag economy. This should be good news for our industry and equipment manufacturing. I, like most farmers, remain optimistic.

AEM Kicks Off Year-Long 125th Anniversary Celebration

AEM officially kicked off its year-long 125th anniversary celebration late last month.

“For 125 years, AEM has served as a steward of our industry and provided an industry-wide consortium that transcends individual member company size, products or individual business concerns,” said John Lagemann, SVP Ag & Turf Sales & Marketing for John Deere and AEM chair. “Through AEM, more than 1,000 member companies take off their proverbial competitive hats and work together on key issues for the betterment of the industry.”

Each month, AEM will feature an enlightening and entertaining conversation with one of its volunteer leaders at www.aem.org/125-years.

“As we give a nod to our past endeavors, we asked our member leadership to share what AEM has meant to them and their organizations. The result is AEM’s leadership stories, their look back and their look ahead to the next 125 years.”

AEM will also feature anniversary updates throughout the year in the AEM Industry Advisor. Don’t miss any updates by subscribing to the newsletter at www.aem.org/subscribe.
A Look Ahead

The 2019 AEM Ag Sector Board was announced at the 2018 Annual Conference. The Board set priorities for the year as follows:

- Implement strategy for AEM’s role in Precision Ag
- Maintain and grow AEM global ag leadership position
- Collaborate with other agriculture organizations for unified messaging on common issues
- Foster positive dealer and manufacturer relationships
- Elevate member experience for statistical reporting programs
- Improve customer connections
- Implement plan for rural and agricultural industry workforce development
- Proactively address state and federal advocacy issues

Welcome to Our 2019 Ag Sector Board

Jerry Johnson
Ag Sector Chair
President, Farm, Ranch & Agriculture Division, Blount International

Todd Stucke
Ag Vice Chair
Sr. VP, Marketing, Product Support & Strategic Projects, Kubota Tractor Corp.

Grant Adolph
COO, Buhler Industries

Mark Core
Executive VP & Chief Marketing Officer, Vermeer

Bill Hurley
VP, After Sales, Customer Support & Distribution Development NA, AGCO

Darryl Matthews
Sr. VP, Trimble

Leif Magnusson
President, CLAAS Global Sales Americas

Leah Olson
CEO, SeedMaster

Leah Olson
CEO, SeedMaster

Leah Olson
CEO, SeedMaster

Leah Olson
CEO, SeedMaster

Gene Fraser
VP, Global Sales & Marketing, MacDon Industries

Bret Lieberman
VP, New Holland NA, CNH Industrial America

Richard Fox-Marrs
President & CEO, JCB Inc.

John Lagemann
Sr. VP Sales & Marketing, Ag & Turf Div, Regions 3 & 4, Deere & Co.

Brian McKown
Executive VP & COO, Kinze Manufacturing

Brian A. Nelson
President & Chairman, HCC, Inc.

Jim Wessing
President, Kondex Corp.

Greg Petras
President, Kuhn NA

Viren Popli
President & CEO, Mahindra USA

Dale Szuminski
President, Alo North America

Matt Daley
Senior VP, GEA Farm Technologies

Gene Fraser
VP Global Sales & Marketing, MacDon Industries

Jerry Johnson
Ag Sector Chair
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Bret Lieberman
VP, New Holland NA, CNH Industrial America

Richard Fox-Marrs
President & CEO, JCB Inc.
Commodity Classic Renews AEM Partnership

The National Corn Growers Association, the American Soybean Association and the Association of Equipment Manufacturers announce that AEM will continue their participation in Commodity Classic, now as a partner and member of the event’s new management committee. This farmer-driven partnership will provide a strong basis for further growth while providing new, innovative ideas for Commodity Classic to provide an even better world-class experience and gathering place for all segments of agriculture.

The inaugural event under this new partnership will be held February 28-March 2, 2019, in Orlando, Florida.

Curt Blades, AEM senior vice president, said, “Over the past three years, we have been incredibly impressed as we grew our involvement in Commodity Classic, and our association takes great pride in the role that we play and experiences we bring to the table. Great things can happen in the industry when leaders work together, have a long-term vision and stay focused.”

“Commodity Classic has continued to grow over the years, and we look forward to even greater growth over the years to come,” said NCGA President Lynn Chrisp, a Nebraska corn grower. “We feel strongly that this relationship maintains the strength of our show, which continues to be produced by farmers and for farmers. At the same time, it will also leverage AEM’s many years of experience and expertise in producing top quality trade shows.”

“We all value the power of education and of top-quality interaction among attendees and exhibitors on the show floor,” said ASA President Davie Stephens, a soybean grower from Kentucky. “Commodity Classic’s farmer focus remains its greatest strength. Agriculture, as an industry, is truly interconnected. By working together, we increase our collective strength and grow our opportunities for success.”

The show will continue – and even elevate - its proud tradition of offering valuable education sessions, innovations exhibited on the show floor and unparalleled peer-to-peer networking.

Commodity Classic is the annual convention and trade show for the American Soybean Association, National Corn Growers Association, Association of Equipment Manufacturers, National Association of Wheat Growers, and National Sorghum Producers.

For more information, visit www.commodityclassic.com.

Davidson Prize Returns in 2019

Is your company a winner of a 2019 ASABE AE50 Award? Presented by AEM, the Davidson Prize is awarded annually to the best of the best within the AE50 winners. The top 10 placing AE50 products were judged by a second panel to determine the winners of the 2019 Davidson Prize.

“AEM is so pleased to partner with ASABE to help recognize the cream of the crop within the elite AE50 winners. The Davidson Prize was created to further highlight the incredible innovation shown by engineers in our industry” said Curt Blades, AEM senior vice president of ag services. “The quality of entries is simply amazing.”

AE50, sponsored by the American Society of Biological and Systems Engineers (ASABE), is the only awards program of its kind, celebrating product innovations in the areas of agricultural, food, and biological systems. AE50 winners include machines, systems, components, software and services ranked highest in innovation, significant engineering advancement and impact for the markets they serve. AE50 Awards are presented at ASABE’s annual Agricultural Equipment Technology Conference (AETC) in February.

All AEM members are invited and encouraged to join us for the announcement of the Davidson Prize winners in the AEM booth at Commodity Classic (held in Orlando, Florida from Feb. 28-March 3) at 3 p.m. EST on March 1.

For more information, contact AEM’s John Rozum at jrozum@aem.org.
Record-Breaking Annual Conference Explores the ‘Power of Twelve’

A record-breaking number of participants and speakers participated in the 2018 Annual Conference, held at the Terranea Resort in Rancho Palos Verdes, California.

The two-day conference explored “The Power of Twelve” — how humans, together with technology, are changing the world in ways we never imagined. The conference featured presentations from TrendHunter, IBM Watson, AT&T and political correspondent Hugh Hewitt.

Be sure and save the date for the 2019 AEM Annual Conference, slated for Nov. 18-20 in Marco Island, Florida.

For more information, visit aem.org/annual.

Norbert Schlingmann, general manager of the Agricultural Industry Electronics Foundation, recently made an appearance as the keynote speaker at November’s AgGateway Annual Meeting in Austin, Texas. Schlingmann spoke on the history of the AEF, the development of the SO 11783 standard, and a number of other topics. AEM is a Steering Committee member of the AEF and also provides support to the Chair Group in the role of Secretariat.
January 2019 saw increases in U.S. sales of self-propelled combines and 4-wheel-drive tractors as well as total U.S. 2-wheel-drive tractor sales compared to January last year.

“For U.S. sales, our January numbers appear to be following a similar pattern as year-end, with continued overall positive data despite a weak overall farm economy. However, we are still concerned about continued market uncertainty and its effect on farmers’ business planning,” said Curt Blades, AEM senior vice president of ag services.
AEM and Agrievolution are happy to announce the launch of four new Ag Indexes available for free for AEM members for internal usage only. The new indexes track forage harvesters, balers, combines and tractors across 10 regions and 19 countries on a quarterly basis. The information is currently available in an easy to download excel format on the AEM website under the Agrievolution Industry Reports page of the Market Data segment. In Q3 2018, the worldwide aggregated index showed that all four product categories have experienced strong growth since mid-2016, are either closing in on their pre-downturn all-time high, or have already surpassed it. The Agrievolution Alliance is a global coalition of agriculture equipment manufacturing organizations whose mission is to advocate for global mechanization on behalf of its 6000-plus collective member companies, from 15 worldwide organizations. Indices are published quarterly and business indicators are published twice annually.

Q3 2018 NA Ag Equipment Surveys & Economy

The North America Ag Equipment Industry Trends Report is a quarterly state of the industry report for the agriculture industry. The survey is based on Net Rising Indexes, and we take the positive answers and detract the negative ones. Anything below zero means a market contraction, anything above growth. The closer to 1 or -1 the index gets, the stronger the market consensus. To receive the full results of this survey, please sign up by contacting Benjamin Duyck at bduyck@aem.org

According to the Net Rising Index of Demand for Whole Goods and Parts Year over Year, the consensus on growth dropped slightly from 0.41 to 0.29, mainly due to a drop in experienced demand for whole goods. Roughly 50 percent of respondents indicated demand remained unchanged. The NRI for Planning fell to 0.32 from 0.6 in the previous quarter, as more and more members are feeling the impact of the tariffs causing an increase in the price to manufacture equipment and a decrease in expected farmer purchasing power. While the industry is still in a boom phase, the cycle seems to be slowing again.
### Key Themes for Agribusiness in 2019

With 2018 ended, Fitch Solutions highlights their key global views for the agribusiness sector in 2019:

<table>
<thead>
<tr>
<th>Themes</th>
<th>Description</th>
<th>Metrics</th>
<th>Winners</th>
<th>Losers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agricultural Commodities: Higher Prices Ahead</strong></td>
<td>After several years of weak performance, we believe agricultural prices have bottomed. Although timing a reversal is challenging, a conjunction of factors is in place for significant price gains in the coming years.</td>
<td>Quantitative: individual price gains in 2019 relative to spot prices and to 2018 average prices</td>
<td>Farmers (unless where yields are negatively impacted by an event), machinery sales</td>
<td>Livestock producers, soybean crushing operations (higher feed costs) and food manufacturers</td>
</tr>
</tbody>
</table>

| US-China Tensions Will Have Broad Repercussions For Global Agribusiness | The US-China trade tensions are likely to linger into 2019 and will be decisive for the sector’s outlook. They will increasingly impact agribusiness trade and start reshaping traditional production and consumption patterns. | Qualitative: trade volumes and rhetoric. Quantitative: plantings in China, the US and Brazil | Alternative suppliers to China (Brazil, Argentina, Australia, India) unless US-China agricultural trade normalises | Grain traders (origination segments) |

| Key Reforms Marching On With A 2019 Focus On Land Use Regulations Changes | Government regulations will remain a key facet that will increasingly impact the agribusiness sector in 2019. One particular policy that will feature in 2019 is related to land use, with some countries loosening regulations (Brazil) and others strengthening environmental protection (the EU and Indonesia, for example). In South Africa the potential land expropriation policy will impact the sector. | Qualitative: number of countries reforming agriculture, particularly land-use policies | Brazilian crop and cattle farmers | Palm oil sector in Indonesia and Malaysia, crop-based biofuel producers in Europe |

| Weak Farmers’ Margins To Weigh On Agribusiness Input Sector | Fertiliser prices have started to revive in 2018 and will remain supported in 2019. However, farmers’ margins are under increasing pressure (US, EU, Australia) at a time when market uncertainty is high. This will weigh on input and machinery sales in 2019, except in some isolated markets. | Quantitative: machinery sales in 2019 in key markets, fertiliser price performance in 2019 relative to 2018. | Input sales in Brazil (strong farm margins with weak real), India (support to farmers, probable normal weather in 2019, etc), input companies investing in tech solutions/machinery/devices | Machinery sales in 2019 |

| Agribusiness Companies: Sector-Specific And Broader Market Challenges Ahead | Agricultural equities will continue to underperform benchmark equity index in 2019 as competitive challenges, macroeconomic concerns and oversupplied markets conspire to limit earnings growth. | Total return performance of the proprietary Fitch Solutions agribusiness index vs the MSCI World Index | Chocolate and fertiliser companies | Palm oil, sugar, meatpackers, EU dairy companies |

### Upside For Most Commodities in 2019

Selected Commodities - Price Forecasts (average)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Cocoa (GBP/tonne)</td>
<td>2,098</td>
<td>2,199</td>
<td>1,575</td>
<td>1,675</td>
<td>1,775</td>
<td>1,750</td>
</tr>
<tr>
<td>Coffee (USc/lb)</td>
<td>131</td>
<td>136</td>
<td>135</td>
<td>135</td>
<td>117</td>
<td>120</td>
</tr>
<tr>
<td>Milk (USD/cwt)</td>
<td>15.8</td>
<td>15.2</td>
<td>16.1</td>
<td>15.3</td>
<td>15.0</td>
<td>15.5</td>
</tr>
<tr>
<td>Sugar (USc/lb)</td>
<td>13.1</td>
<td>18.3</td>
<td>15.8</td>
<td>12.2</td>
<td>12.6</td>
<td>13.8</td>
</tr>
<tr>
<td>Palm Oil (MYR/tonne)</td>
<td>2,235</td>
<td>2,631</td>
<td>2,704</td>
<td>2,326</td>
<td>2,400</td>
<td>2,475</td>
</tr>
<tr>
<td>Cotton (USc/lb)</td>
<td>63.3</td>
<td>65.7</td>
<td>73.5</td>
<td>82.7</td>
<td>81.0</td>
<td>79.0</td>
</tr>
<tr>
<td>Corn (USc/bu)</td>
<td>377</td>
<td>358</td>
<td>369</td>
<td>378</td>
<td>400</td>
<td>420</td>
</tr>
<tr>
<td>Rice (USD/cwt)</td>
<td>11.1</td>
<td>10.3</td>
<td>11.1</td>
<td>11.6</td>
<td>11.4</td>
<td>11.5</td>
</tr>
<tr>
<td>Soybean (USc/bu)</td>
<td>945</td>
<td>989</td>
<td>984</td>
<td>945</td>
<td>1,000</td>
<td>1,010</td>
</tr>
<tr>
<td>Wheat (USc/bu)</td>
<td>507</td>
<td>436</td>
<td>452</td>
<td>508</td>
<td>525</td>
<td>525</td>
</tr>
</tbody>
</table>

### Slow Declining Supply

Selected Commodities - Production Balance

![Slow Declining Supply Graph](chart.png)
That’s a Wrap for the 2018 *I Make America* Town Hall Tour

The *I Make America* Town Hall Tour featured a series of events at equipment manufacturing facilities across the country leading up to the mid-term elections in November.

The goal was to engage with supporters to help move a pro-manufacturing agenda forward. Each event featured industry and policy experts having a meaningful conversation about the current policy affecting the equipment manufacturing industry.

The Town Hall Tour kicked off at AGCO Corporation’s Intivity Center in Jackson, Minnesota, with a discussion about the symbiotic relationship between the agriculture economy and the equipment manufacturing industry. More than 150 AGCO employees had the opportunity to participate in the event.

The tour then moved to Doosan Bobcat’s Acceleration Center in Bismarck, North Dakota, where a panel of experts had an important conversation about infrastructure and the many ways it impacts the equipment manufacturing industry.

The final event focused on trade and trade policies impacting the equipment manufacturing industry. Trade and the use of tariffs have become an important issue this year as the Trump administration has put into place billions worth of tariffs on aluminum and steel, as well as tariffs on imported goods from China. The Town Hall took place at Terex AWP’s Genie showroom in Redmond, Washington.

As a result of these Town Hall Tour events, more than 500 manufacturing workers had the opportunity to participate in person, and over 3,000 watched via livestream through the *I Make America* Facebook, Twitter and website.

For more information about the Town Hall Tour, please visit [www.imakeamerica.com/townhalltour](http://www.imakeamerica.com/townhalltour).

By Chelsea Honnette, Project Manager AGCO.

There’s over 1.3 million men and women in the equipment manufacturing industry in the U.S. That number often surprises people.

What also surprises folks is that many of those workers are also farmers — like my family, owners of about 500 acres of a farm producing soybeans and corn.

My day job is acting as a Program Manager with the AGCO Corporation, a global equipment manufacturer, at its Intivity Center based in Jackson, Minnesota. AGCO is the world’s largest manufacturer of machinery and equipment needed for farmers just like me.

It also means that I care a lot about policies that can impact both my job and my farm. And that happens a lot working in agriculture equipment manufacturing. From the 2018 Farm Bill, which once passed would provide much-needed stability for the agricultural economy, to U.S. trade policies, like tariffs currently imposed on goods coming from China or on steel and aluminum.

These are policies that make a big difference between a farmer like me making a profit on my yield or my manufacturing co-workers just trying to provide a stable quality of life for their family.

New “Stories” feature on imakeamerica.org — featuring the men and women of the equipment manufacturing industry. These stories are intended to provide perspectives on relevant and timely issues by supporters for supporters.

Head over to [www.imakeamerica.org/stories](http://www.imakeamerica.org/stories) to catch up on the latest!

If you or someone from your company has an interesting story to tell, please reach out to AEM Public Affairs Director David Ward (dward@aem.org, tel: 202-898-9007).
Technical Innovation

Is Your Organization ‘Thinking Forward’ in 2019?

By Paul Flemming, AEM Senior Director of Membership and Engagement

Shedding light on disruptive, cutting-edge trends and technologies poised to impact the equipment manufacturing industry in the not-too-distant future has been a priority of great significance for AEM in the last few years.

But our association’s efforts to inform our members and the industry at large through our Thinking Forward series of events and related thought leadership content are only worthwhile if equipment manufacturers take advantage of unique opportunities to gain information and insights they can incorporate into day-to-day business activities.

That’s why we’re excited to announce our plans to help AEM members do just that through our 2019 lineup of Thinking Forward events. This year’s kickoff event took place Feb. 20-21 in Washington D.C., where attendees were afforded an opportunity to visit the Airbus D.C. Experience Center. We had a great lineup of speakers at our inaugural event of 2019: Maritz’s Charlotte Blank discussed what motivates the customer of the future, Dr. Lonnie Love presented on the topic of additive manufacturing, and McKinsey & Co.’s Paolo Sandrone discussed the customer decision journey.

The night before the Feb. 21 Thinking Forward event, on Feb. 20 from 5:30-7 p.m. ET, we held a reception at the new AEM Washington D.C. office.

AEM is committed to building on the success of Thinking Forward in 2019. In addition to the kickoff event in our nation’s capital, this year’s slate of seven events will include stops at a number of innovation centers across the country and a trip to Canada. Locations include the Airbus D.C. Experience Center, the Johnson Space Center in Houston, the Henry Ford Museum in Dearborn, Michigan, and the Cisco Innovation Centre in Toronto, Ontario.

To see a full schedule of AEM Thinking Forward locations, visit www.aem.org/think. Sign up today to attend one of these new and exciting events to help keep your company “Thinking Forward” in 2019 – and beyond.

Finally, the AEM membership team is always here to help. Please give me a call at any time, 414-298-4150, or email me at pflemming@aem.org.

<table>
<thead>
<tr>
<th>2019 DATES</th>
<th>LOCATION</th>
<th>TOPIC</th>
<th>SPEAKER</th>
<th>TOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday, March 12</td>
<td>Johnson Space Center, Houston, TX</td>
<td>MARS AND THE NEXT-GEN WORKFORCE</td>
<td>The Mars Generation – Astronaut Army Technology Transfer – NASA</td>
<td>Space Center Houston</td>
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<tr>
<td>Tuesday, April 2</td>
<td>UI Labs Innovation Center, Chicago, IL</td>
<td>DIGITAL MANUFACTURING BEST PRACTICES</td>
<td></td>
<td>UI Labs Innovation Center</td>
</tr>
<tr>
<td>Tuesday, May 14</td>
<td>The Henry Ford Museum, Dearborn, MI</td>
<td>THE FUTURE OF MOBILITY</td>
<td>Modern Mobility – Steve Vozar &amp; Brooke Whitney, May Mobility</td>
<td>The Henry Ford Museum</td>
</tr>
<tr>
<td>Tuesday, September 10</td>
<td>Cisco Innovation Center, Toronto, ON</td>
<td>MICRO-GENERATIONS IN YOUR WORKFORCE</td>
<td>Expanding Opportunities with IoT – Wayne Cuerzo, Cisco Generational Overview – TrendHunters</td>
<td>Cisco Innovation Center</td>
</tr>
<tr>
<td>Tuesday, October 22</td>
<td>Milwaukee School of Engineering, Milwaukee, WI</td>
<td>CASE STUDIES ON AI</td>
<td></td>
<td>Milwaukee School of Engineering</td>
</tr>
<tr>
<td>Tuesday, November 5</td>
<td>St. Louis, MO</td>
<td>CREATING AN INNOVATIVE ENVIRONMENT</td>
<td></td>
<td>Monsanto</td>
</tr>
</tbody>
</table>
Improving Ag In-Field Communications: What the Future Holds

Efforts by the Agricultural Industry Electronics Foundation (AEF) to develop a protocol for in-field communication between ag equipment have been under way for the better part of the last year, with the ultimate goal being to standardize machine-to-machine communication between equipment of different manufacturers.

An AEF project team recently completed a report on its activities and findings, one which outlines the approach taken on a number of organizational objectives. Examples include:

- Use case definitions for ag machinery
- Definition of radio standards for short- and mid-range wireless communication
- Functional safety and security concept
- Usage and integration of existing communication protocols

The team also identified a number of key scenarios of machines in different working activities that require continuous communication. An example of one was a pair of machines working close together, as a parallel platooning operation. In addition, other situations included multiple machines operating in the same field. All are scenarios where staying connected is necessary.

The report also provides two very interesting outcomes from their activities:

1. The recommendation of a communication standard that provided acceptable results in field testing.
2. The ability of ag equipment to communicate with other highway equipment using the same standard.

During field testing of equipment in different harvest scenarios, the use of IEEE 802.11p provided promising results in short- to mid-range communication.

Also, in an interesting collaboration between AEF, the Car2Car Consortium, the European Telecommunication Standards Institute (ETSI), AgGateway and ISO, a successful field test was conducted between a car and tractor to demonstrate the ability of different types of equipment communicating using the IEEE 802.11p standard. The car and tractor shown below were used to prototype this protocol to communicate important safety messages while both were traveling on a highway.

All these activities are moving the ag industry in the right direction and leading it toward an exciting future as everyone becomes more connected in ways never thought possible.

For more details on all the AEF team activities and findings, please visit www.aem.org.

AEM is a Steering Committee member of the AEF and also provides support to the Chair Group in the role of Secretariat.

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